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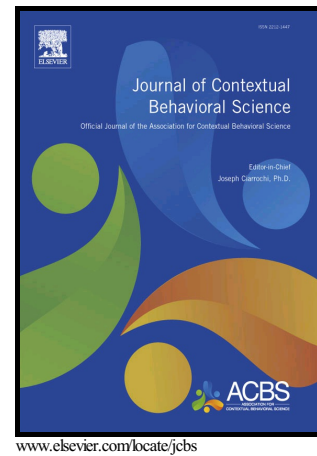
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# Author's Accepted Manuscript

## Further validation of the Chronic Pain Values Inventory in a Swedish chronic pain sample

Sophia Åkerblom, Sean Perrin, Marcelo Rivano Fischer, Lance M McCracken



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Further validation of the Chronic Pain Values Inventory in a Swedish chronic pain sample

Sophia Åkerblom MSc<sup>1,2</sup>; Sean Perrin PhD<sup>2</sup>; Marcelo Rivano Fischer PhD<sup>1,3</sup>; Lance M McCracken PhD<sup>4</sup>

<sup>1</sup>*Department of Pain Rehabilitation, Skåne University Hospital, Lund, Sweden*

<sup>2</sup>*Department of Psychology, Lund University, Lund, Sweden*

<sup>3</sup>*Department of Health Sciences, Lund University, Lund, Sweden*

<sup>4</sup>*Psychology Department, Health Psychology Section, King's College London, UK*

**Authors' emails:**

sophia.akerblom@psy.lu.se

sean.perrin@psy.lu.se

marcelo-rivano@med.lu.se

lance.mccracken@kcl.ac.uk

**Corresponding author's contact details:**

Sophia Åkerblom

Department of Psychology

Lund University

Box 213, 221 00 Lund, Sweden

Email: sophia.akerblom@psy.lu.se

Phone: +46(0)46-172-610

Mobile: +46-707-790-415

Title: Further validation of the Chronic Pain Values Inventory in a Swedish chronic pain sample

**Abstract**

**Purpose:** Value based action is an important process in the psychological flexibility model and is associated with daily functioning in people with chronic pain, but measures of it are not well-developed. The purpose of the present study was to examine the reliability and validity of a Swedish-language version of the Chronic Pain Values Inventory (CPVI) in a large sample of adults seeking treatment for chronic pain.

**Material and methods:** A Swedish version of the CPVI was created and administered alongside other measures of psychological flexibility and pain-related functioning in a convenience sample of 232 patients admitted for treatment at [redacted for blinding purposes] between February 2014

and December 2015. Internal consistency of the CPVI was assessed as was its relationship to theoretically related facets from the psychological flexibility model. The utility of values-related processes in explaining variance in pain-related functioning was also examined by correlations and hierarchical regression analyses.

**Results:** Overall, this Swedish-language version of the CPVI was found to have satisfactory reliability and validity. The CPVI subscales yielded high levels of internal consistency. Evidence of construct validity in relation to other measures from the psychological flexibility model was observed as well as evidence of clinical utility in relation to measures of pain-related functioning.

**Discussion:** This brief self-report measure of values-based action seems to yield valid data in Swedish adults suffering from chronic pain. Values based processes appear important within evidence-based treatments for chronic pain, especially Acceptance and Commitment Therapy (ACT), and the CPVI may help assess these, particularly in predictor studies of pain-related functioning and analyses of therapeutic change processes or mechanisms.

**Key words:** Values, CPVI, Acceptance and Commitment Therapy, the Psychological Flexibility Model, reliability, validity

## **Introduction**

There is a growing body of evidence that Acceptance and Commitment Therapy (ACT) is an efficacious treatment for chronic pain (Hann & McCracken, 2014). Within ACT the focus is on healthy activity and wellbeing achieved through psychological flexibility and one important treatment process within the framework is values (Hayes, Strosahl, & Wilson, 1999). Values-related processes aim to improve daily functioning by helping people to initiate and persist in actions that serve their important purposes and are done with the quality in which they want to do them. Thus “valuing” is seen as an important process to promote behavioral direction, meaning, and motivation within the model of psychological flexibility (Dahl, Plumb-Villardaga, Stewart, &

Lundgren, 2009). The particular relevance of improving values-based action in adults with chronic pain arises when one considers that much of the behavior of those with chronic pain is focused on understanding, reducing, problem-solving, or avoiding pain and not on work, relationships, or other positive goals – in this way pain guides their actions instead of “values” guiding their actions.

Value-based action is associated with better functioning in individuals with chronic pain (McCracken & Keogh, 2009; McCracken & Yang, 2006). There are also data showing that values-based action improves in treatment based on ACT and these improvements are associated with improvements on diverse measures of outcome (Vowles & McCracken, 2008; Vowles, Witkiewitz, Sowden, & Ashworth, 2014). Still, relatively few studies within the chronic pain field, or in any field more generally, have attempted to measure and examine values-related processes. Additional studies are needed of the relationship between values-related processes, functioning in individuals with chronic pain, and treatment outcome – and for this purpose brief, reliable and valid measures of values are needed (McCracken & Yang, 2006; VanBuskirk et al., 2012). So far a small number of values measures appear potentially adequate or clinically useful, including the Valued Living Questionnaire (Wilson, Sandoz, Kitchens, & Roberts, 2010), Bull’s eye (Lundgren, Luoma, Dahl, Strosahl, & Melin, 2012), and the Chronic Pain Values Inventory (CPVI) (McCracken & Yang, 2006). By no means have any of these had comprehensive psychometric analysis and validation.

The CPVI was developed for use with individuals who suffer from chronic pain (McCracken & Keogh, 2009; McCracken & Vowles, 2008; McCracken LM, 2009; McCracken & Yang, 2006; Vowles & McCracken, 2008; Vowles, Witkiewitz, Sowden, & Ashworth, 2014). It is a theoretically-derived measure that assesses both the *importance* to the individual of values in six domains (i.e., family, intimate/close interpersonal relations, friends, work, health, and personal growth/learning) and the degree of *success* the individual achieves in behaving in line with these values. The English-language original has been shown to possess adequate psychometric properties, to correlate in the small to moderate range with other constructs from the psychological flexibility model and with key indices of functioning, and to partially explain variation in pain-related functioning independent of pain-related acceptance in adults seeking treatment for chronic pain (McCracken & Keogh, 2009; McCracken & Vowles, 2008; McCracken LM, 2009; McCracken & Yang, 2006; Vowles & McCracken, 2008; Vowles, Witkiewitz, Sowden, & Ashworth, 2014). This measure has not been validated in another language.

The present study aimed to examine the reliability and validity of a Swedish-language version of the CPVI in a sample seeking treatment for chronic pain. First, improvements in psychological flexibility are assumed to include increases in values-based action but whether increases in one domain are accompanied by increases in others remains unclear (Wilson, Sandoz, Kitchens, & Roberts, 2010). In the original CPVI validation study, carried out with 140 adults seeking treatment at a specialist pain unit in Britain, the authors found similarly high Cronbach alphas for both values success and values discrepancy (both  $\alpha = .82$ ) suggesting that the participants respond consistently across the six functioning domains assessed by the measure (McCracken &

Yang, 2006). We examine the internal consistency of this Swedish translation of the measure and expect similarly high  $\alpha$ 's for both subscales.

Second, we expand upon previous studies by examining the construct validity of the CPVI through its relationship to separate measures of two theoretically related processes from the psychological flexibility model (committed action and pain-related acceptance) and a measure designed to assess psychological inflexibility broadly. Based on prior research (McCracken & Yang, 2006), we anticipate that patients reporting higher levels of values success would report greater levels of pain-related acceptance and committed action and lower levels of psychological inflexibility, with all correlations in the small to moderate range (McCracken & Yang, 2006). A reversed correlation pattern is expected between the same variables and values discrepancy.

Third, consistent with the psychological flexibility model, where a number of interrelated but distinct constructs contribute to psychological flexibility, we anticipate that values-based action, pain-related acceptance, and committed action will make separate and significant contributions to the total variance in this overarching construct (Hayes, Strosahl, & Wilson, 2012; McCracken & Morley, 2014).

Fourth, we examine the utility of values-related processes in explaining variation in the overall functioning in adults seeking treatment for chronic pain. Based on previous research (McCracken & Yang, 2006), we expect patients with higher levels of values success to report lower levels of depression, anxiety, and pain interference, and higher levels of physical functioning, social functioning, vitality, and overall mental health, with all correlations in the small to moderate range. A reversed pattern is expected between the same variables and values discrepancy. Also, in a previous study (McCracken and Yang 2006), scores on the CPVI were shown to explain



variance in measures of pain-related functioning after controlling for the influence of pain-related acceptance. Its contribution to pain-related functioning in the presence of other processes from the psychological flexibility model remains untested. We undertake a preliminary evaluation of the incremental validity of the CPVI after controlling for both pain-related acceptance and committed action.

## Material and methods

### Participants

Participants in this convenience sample ( $n=232$ ) were adults who were consecutive referrals admitted for treatment at [redacted for blinding purposes] between February 2014 and December 2015 and who had completed the measures of psychological flexibility and pain-related functioning. The unit is a government supported, regional specialist center for adults (aged 18 years and above) who have symptoms of chronic pain that impacts significantly on everyday life. The unit offers intensive, multi-disciplinary, outpatient treatment based on a cognitive behavioral approach. All participants gave written informed consent prior to their data being used in the study and they were not reimbursed for their time. The study was approved by the Regional Ethical Review Board in [redacted for blinding purposes].

The sample consisted of 198 women (85.3%) and 34 men with an average age of 41.6 years ( $SD = 9.9$ ). The majority was born in Sweden or another Nordic country (81.0%) and all participants were able to speak Swedish fluently. Most (59.7%) were currently in work or studying at least on a part-time basis. Slightly more than half (53.7%) had upper secondary school as their highest level of education with a further 30.7% having studied at university level. Individuals admitted for treatment at the unit present with diverse pain-related disorders, the most frequent primary pain diagnoses being fibromyalgia (40.5%), cervicocranial syndrome (9.5%), cervicobrachial

syndrome (9.5%), lumbago (6.9%), and myalgia (4.3%). On average the participants reported pain of 8.2 years duration ( $SD = 8.1$ ) with the number of pain locations varying between 2 and 36 ( $M = 17.3$ ,  $SD = 8.5$ ). At referral, usual pain intensity (rated on a 0-10 scale) averaged 7.2 ( $SD = 1.4$ ). The sociodemographic and clinical characteristics of this sample were similar to the unit's referrals as a whole and to patients seeking treatment for chronic pain at other regional specialist pain units across Sweden (Swedish Quality Registry for Pain Rehabilitation, 2015).

### **Translation of the CPVI**

In translating and back-translating the measure, internationally recommended guidelines were followed (Beaton, Bombardier, Guillemin, & Ferraz, 2000). The CPVI was translated from English to Swedish by the first author, a clinical psychologist specializing in clinical research on patients with chronic pain and fluent in both Swedish and English. The Swedish version was then back-translated by a Swedish clinical psychologist fluent in both Swedish and English, who was experienced in instrument translation and validation, and was independent of the research team. An 'expert' group comprised of clinical psychologists working in the field of pain rehabilitation, who were fluent in Swedish and English and independent of the research group, were then asked to evaluate the translated and back-translated versions and to suggest any needed adjustments. Thereafter, 10 current patients at the pain clinic were given the 'final' Swedish version of the measure and asked to give feedback on the clarity of instructions and vocabulary. Minor alterations were made to ascertain that the items reflected the same item content as the English original and the updated version was then given to and approved by the expert group. The Swedish version is available from the first author.

### **Measures**

All newly referred patients were sent copies of the self-report measures of psychological

flexibility and pain-related functioning, as well as brief questionnaires about sociodemographic background. These were to be completed and returned by mail prior to their first full clinical assessment (functioning, suitability for treatment, and diagnosis) at the pain rehabilitation unit and the response rate was 59%.

**Chronic Pain Values Inventory (CPVI):** The 12-item CPVI measures engagement in valued activity. The measure lists six values domains: family, intimate/close interpersonal relations, friends, work, health, and personal growth/learning. First respondents are presented the six domain items and asked to rate the degree to which their values in each domain are important to them on a six-point scale (0 = *not at all important*; 5 = *extremely important*). The six values domains are listed again and respondents are asked to rate the degree to which they have been successful in living according to their values in the same six domains on a six-point scale (0 = *not at all successful*; 5 = *extremely successful*). According to the originators of the CPVI, two scores are extracted: a mean success rating, which is the average of the six success ratings, and a mean discrepancy rating, which is the mean of the differences between importance and success. Again, the CPVI was found to possess adequate internal consistency and to display small to moderate correlations with measures of pain-related functioning in a British sample of treatment-seeking pain patients (McCracken & Yang, 2006). The reliability and validity of this Swedish language version of the CPVI are examined in this study and reported in the results section.

**Committed Action Questionnaire (CAQ-18):** The CAQ has 18 items each rated on a seven-point scale (0 = *never true* to 6 = *always true*) and measures goal-directed, flexible persistence (McCracken, 2013). The CAQ has two components, derived from factor analysis consisting of positively and negatively phrased items respectively. All items are summed (negatively phrased items are first reversed) to arrive at a total score (range = 0-108). The CAQ possesses high levels

of internal consistency in both the English original ( $\alpha = 0.91$ ) and the Swedish translation used here ( $\alpha = 0.89$ ) and both versions correlate well with measures of pain-related functioning (McCracken, 2013; Åkerblom, Perrin, Rivano Fischer, & McCracken, 2016).

**Chronic Pain Acceptance Questionnaire-8 (CPAQ-8):** The CPAQ-8 is an eight-item self-report measure of acceptance for people with chronic pain (Fish, McGuire, Hogan, Stewart, & Morrison, 2010). The eight items are rated on a 7-point scale ( $0 = \text{never true}$ ;  $6 = \text{always true}$ ), and summed to compute a total score, and two subscale scores: *activity engagement* and *pain willingness*. Higher total and subscale scores indicates greater acceptance of pain. The original English-language CPAQ-8 has good internal reliability for the whole scale and the subscales ( $\alpha = 0.77\text{--}0.89$ ), a stable factor structure, and correlates significantly and moderately with measures of pain-related functioning (Baranoff, Hanrahan, Kapur, & Connor, 2014; Fish, McGuire, Hogan, Stewart, & Morrison, 2010). The Swedish version of the CPAQ-8 used in this study has satisfactory internal reliability ( $\alpha = 0.80$ ) and shows similar relationships to measures of pain functioning as the English original (Rovner, Arestedt, Gerdle, Börsbo, & McCracken, 2014).

**Psychological Inflexibility in Pain Scale (PIPS):** The PIPS is a 12-item scale measuring psychological inflexibility in relation to pain, each item being rated on a 7-point scale ( $1 = \text{never true}$ ;  $7 = \text{always true}$ ). A total score is computed as well as two subscales assessing cognitive fusion related to pain and avoidance of pain. Total scores on the measure range from 12-84, with higher scores indicating greater psychological inflexibility. The PIPS was originally written in Swedish and this version of the scale has been shown to have high levels of internal reliability ( $\alpha = 0.87$ ) and small to moderate correlations with measures of pain-related functioning (Wicksell, Lekander, Sorjonen, & Olsson, 2010).

**Hospital Anxiety and Depression Scale (HADS):** The HADS is a 14-item measure of the frequency of symptoms of anxiety (7 items) and depression (7 items) over the past week; designed for use with patients in medical settings (Zigmond & Snaith, 1983). Items are rated on a four-point scale (*0 = not at all; 3 = very often*). Scores on the anxiety and depression subscales range from 0-21 with higher scores indicating greater severity. Consistent with the English original, the Swedish version used in this study has been shown to have excellent internal consistency for the total scale ( $\alpha = 0.90$ ), the anxiety ( $\alpha = 0.84$ ) and depression subscales ( $\alpha = 0.82$ ) and to correlate significantly with alternate measures of anxiety and depression (Lisspers, Nygren, & Soderman, 1997).

**Multidimensional Pain Inventory (MPI, Version 2):** The 2<sup>nd</sup> version of the MPI assesses pain-related functioning with 61 items broken down into three sections, each comprised of its own subscales. Only the pain interference subscale (11 items) from the first section was used in this study with each item rated on a 7-point scale (*0 = never; 6 = very often*) (Rudy, Turk, Zaki, & Curtin, 1989). The original MPI has satisfactory psychometric properties ( $\alpha = 0.72-0.90$ ) (Kerns, Rudy, & Turk, 1985). The Swedish-language version of the MPI used in this study has been shown to be sensitive to the effects of treatment for chronic pain (Nyberg, Novo, & Sjolund, 2011).

**Medical Outcomes Study Short Form 36-Item Health Survey (SF-36):** The SF-36 is a self-report measure of non-disease-specific health and functioning used widely in health research (Ware & Sherbourne, 1992). The 36 items produce eight subscales scores but only the following were used in this study: physical functioning (10 items); social functioning (2 items); vitality (4 items); and mental health (5 items). All subscales are transformed to a 0-100 scale with higher scores indicating a greater health state. Like the English-language original (Ware & Sherbourne,

1992), the Swedish version used in this study has been shown to have satisfactory internal reliability for the subscales ( $\alpha = 0.79$  to  $0.91$ ) and clinical validity when compared with other measures of health functioning (Sullivan, Karlsson, & Ware, 1995).

### **Statistical approach**

The internal consistency of the CPVI was examined via item-total correlations and Cronbach's alpha. Item-total correlations above  $r = .30$  and a Cronbach's alpha above  $.70$  were considered acceptable (Nunnally & Bernstein, 1994). The construct validity of the CPVI was evaluated through pairwise correlations with convergent constructs from the psychological flexibility model (Hayes et al. 2012; McCracken & Morley, 2014): committed action as measured by the CAQ, pain-related acceptance as measured by the CPAQ-8, and psychological inflexibility as measured by the PIPS. Consistent with recommendations on the validation of health-related measures, specific hypotheses regarding the direction and magnitude of all correlations were made a priori (De Vet, Terwee, Mokkink, & Knol, 2011; Mokkink, Terwee, Knol, et al., 2010; Mokkink, Terwee, Patrick, et al., 2010). Pearson correlation coefficients were calculated and correlations evaluated as small ( $.1$ -. $.3$ ), moderate ( $.3$ -. $.5$ ), or strong ( $.5$ -  $1.0$ ) (Cohen 1988). In addition, regression analysis was carried out to examine the relative contribution of values success and discrepancy (using the CPVI subscales separately), committed action (CAQ), and pain-related acceptance (CPAQ-8) to the overall variance in psychological inflexibility, the overarching process in the psychological flexibility model, as measured by the PIPS.

We investigated the clinical utility of this Swedish-language version of the CPVI through a series of pairwise correlations with measures of pain-related functioning, as indexed by anxiety and depression (HADS), pain interference (MPI) and physical functioning, social functioning, vitality and mental health (SF-36). Again, specific hypotheses regarding the direction and magnitude of

all correlations were made a priori (De Vet, Terwee, Mokkink, & Knol, 2011; Mokkink, Terwee, Knol, Stratford, Alonso, Patrick, Bouter, & de Vet, 2010; Mokkink, Terwee, Patrick, Alonso, Stratford, Knol, Bouter, & de Vet, 2010). Finally, we investigated the incremental validity of the CPVI through a series of hierarchical multiple regression analyses, which examined the separate contributions of values success and discrepancy to variance in pain-related functioning while controlling for the influence of committed action (CAQ) and pain-related acceptance (CPAQ). The same indices of pain-related functioning were used as dependent variables: depression and anxiety (HADS); pain interference (MPI); physical functioning, social functioning, vitality and mental health. The regression model included CAQ and CPAQ (step 1) and CPVI (Step 2). There is no accepted consensus on the number of subjects needed to validate a scale (Anthoine, Moret, Regnault, Sébille, & Hardouin, 2014). The current sample size of 232 was deemed sufficient based on established guidelines for multiple regression analysis ( $N \geq 104 + m$ , where  $m$  is the number of independent variables) (Green, 1991). All analyses were conducted using SPSS (Version 22).

## Results

### Attrition analyses

Before conducting the analyses of the study, a total of 18 patients were excluded due to missing more than half of the scores on the CPVI. For the remaining 214 patients the percentage of missing data on the various measures was low (range = 0 to 6.5 %). Little's MCAR test was non-significant indicating that the data were missing at random (Chi-square = 512.10,  $df = 480$ ,  $p = .150$ ). Thus it was deemed appropriate to impute missing values using the Expectation-Maximization (EM) method (Schafer & Graham, 2002). Visual inspection of histograms, normal Q-Q plots and boxplots was carried out to assess whether items were approximately normally

distributed. Values in each of the six values domains were rated as highly important by the participants resulting in ceiling effects and skewed distributions (skewness range= -3.09 to -.75) with some divergence from the normal distribution (kurtosis range = .25 to 10.94). Overall, the success (skewness range= .39 to .91; kurtosis range=-.45 to .32) and discrepancy ratings (skewness range= -.69 to -.22; kurtosis range=-.46 to 1.03) showed greater variation, symmetry, and approximation of a more normal distribution. Outliers at the scale level (n=1) were identified with the outlier labelling rule using 2.2 as a multiplier and the affected values were winsorized and included in all analyses (Hawkins, 1980; Hoaglin & Iglewicz, 1987).

### Item analyses

Response rates for all items of the CPVI were > 97.7%. Items from the same subscale correlated with each other at an acceptable level (success,  $r = .38$  to  $.63$ ; discrepancy,  $r = .33$  to  $.59$ ) Item-total correlations were consistently >.30 analyzing the subscales separately (success, range = .59 to .70; discrepancy, range= .58 to .66). In line with our expectations both the success ( $\alpha = 0.84$ ) and discrepancy ( $\alpha = 0.84$ ) subscales showed high levels of internal consistency. Means and standard deviations for the importance, success and discrepancy ratings across all domains are presented in Table 1.

Table 1

Means and Standard Deviations of Importance, Success and Discrepancy scores

Domain	Values importance M (SD)	Values success M (SD)	Values discrepancy M (SD)
All Domains	4.04 (.64)	1.69 (.92)	2.35 (1.12)
Family	4.68(.77)	2.43 (1.23)	2.25 (1.39)
Intimate relations	4.21 (1.17)	1.66 (1.22)	2.55 (1.52)
Friends	3.80 (1.07)	1.62 (1.16)	2.18(1.45)



Work	3.89 (1.11)	1.59 (1.33)	2.30 (1.66)
Health	3.80 (1.02)	1.24 (1.12)	2.56 (1.40)
Growth and learning	3.85 (1.08)	1.59 (1.30)	2.25(1.55)

### Construct and incremental validity

The correlation between the values success and values discrepancy scores was in the strong range ( $r = -.81, p < .01$ ). Pearson correlations coefficients between the values success and discrepancy scores from the CPVI and scores on the measures used to assess construct validity are presented in Table 2. The direction of all correlations and the magnitude of most correlations were consistent with our expectations. Moderately sized correlations were observed between the success subscale of the CPVI and total scores on the measures of pain-related acceptance (CPAQ-8) and psychological inflexibility (PIPS). A small correlation was found between values success and committed action (CAQ). A similar but reversed pattern was observed for the discrepancy subscale of the CPVI, with the exception that the correlation between values discrepancy and committed action (CAQ) did not reach significance. Also in line with expectations, the CPVI, CAQ and CPAQ-8 made individual and significant contributions to explaining the variance in total scores on the measure of psychological inflexibility (PIPS). Using regression analysis, total scores on values success, committed action (CAQ) and pain-related acceptance (CPAQ-8) accounted for 48% of the variance in psychological inflexibility (PIPS) ( $R = .69, R^2 = .48$ , Values success Beta=  $-.14, t = -2.71, (p < .01)$ ; CAQ Beta=  $-.22, t = -4.12 (p < .01)$ ; CPAQ-8 Beta=  $-.51, t = -9.14 (p < .01)$ ). The regression analysis was repeated using the values discrepancy score instead of values success and yielded similar results.

Table 2 also presents correlations between the values success and discrepancy subscales of the CPVI and measures of pain-related functioning. Generally, the associations were as hypothesized in direction and magnitude. Greater success at living according to values and less discrepancy between the importance of values in each domain and the degree of success were related to better pain-related functioning.

Table 2 Correlations between the values success and discrepancy subscales of the CPVI, other processes from the psychological flexibility model and measures of pain-related functioning

	CPVI- Values success	CPVI- Values discrepancy
CPAQ-8 – Pain-related acceptance	.33 **	-.33 **
CAQ - Committed action	.22 **	-.06
PIPS - Psychological inflexibility	-.36 **	.41 **
Depression	-.36**	.30**
Anxiety	-.11	.18**
Pain interference	-.33**	.35**
Physical functioning	.24**	-.12
Social functioning	.28**	-.28**
Vitality	.32**	-.30**
Mental health	.21**	-.24**

Notes: Values success and discrepancy was assessed with the Chronic Pain Values Inventory, pain-related acceptance with the Chronic Pain Acceptance Questionnaire-8, committed action with the Committed Action Questionnaire, psychological inflexibility with the Psychological Inflexibility in Pain Scale, depression and anxiety with the Hospital Anxiety and Depression Scale, pain interference with the Multidimensional Pain Inventory, physical functioning, social functioning, vitality, and mental health with The Medical Outcomes Study Short Form 36-Item Health Survey

\* $p < .05$  \*\* $P < .01$

With regard to incremental validity, Table 3 presents the results of the hierarchical regression analyses carried out to evaluate the degree to which scores on the values success subscale of the CPVI explained variance in various domains of pain-related functioning over and above the contributions of committed action (CAQ) and pain-related acceptance (CPAQ). Consistent with expectations, scores on the success subscale of the CPVI accounted for a significant proportion of the variance in functioning in four out of six models functioning (range 2% to 5%). The direction of the relationship was consistent: in each case greater success at living according to values was associated with more positive functioning. The total explained variance varied across the different domains of pain-related functioning ( $R^2 = 7\%$  to  $42\%$ ), but was relatively large for depression, pain interference, social functioning and mental health with the total explained variance being 24% or above. In other words, participants reported greater levels of functioning not only associated with greater pain-related acceptance and a greater commitment to pursuing their goals (despite obstacles), but also associated with acting in accordance with their values. The same regression analyses were conducted using values discrepancy instead of values success with similar results.

Table 3 Hierarchical regression analyses of pain-related functioning in relation to committed action, pain-related acceptance and values success

Dependent variable	Block	Predictor	R	$R^2$	$R^2$ change	$\beta$ (final)	t
Depression	1	Committed action	.49	.24	.24	-.16*	-2.45
		Pain acceptance				-.33**	-5.06
	2	Values success	.53	.28	.04	-.22**	-3.50
Anxiety	1	Committed action	.45	.20	.20	-.20**	-2.96
		Pain acceptance				-.35**	-5.12
	2	Values success	.45	.20	.00	.06	.84
Pain interference	1	Committed action	.63	.40	.40	.02	.41
		Pain acceptance				-.59**	-9.98
	2	Values success	.64	.42	.02	-.14*	-2.56
Physical functioning	1	Committed action	.19	.04	.04	.04	.48
		Pain acceptance				.10	1.37

	2	Values success	.26	.07	.03	.20**	2.75
Social functioning	1	Committed action	.47	.22	.22	.05	.71
		Pain acceptance				.41**	6.02
	2	Values success	.49	.24	.02	.14*	2.18
Vitality	1	Committed action	.33	.11	.11	.03	.48
		Pain acceptance				.23**	3.23
	2	Values success	.39	.15	.05	.24**	3.48
Mental health	1	Committed action	.50	.25	.25	.17	2.56*
		Pain acceptance				.40	5.89**
	2	Values success	.50	.25	.00	.04	.67

Notes: Values success and discrepancy was assessed with the Chronic Pain Values Inventory, pain-related acceptance with the Chronic Pain Acceptance Questionnaire-8, committed action with the Committed Action Questionnaire, depression and anxiety with the Hospital Anxiety and Depression Scale., pain interference with the Multidimensional Pain Inventory, physical functioning, social functioning, vitality and mental health with The Medical Outcomes Study Short Form 36-Item Health Survey

Unadjusted  $R^2$  values were used in all hierarchical regression analyses

\* $p < .05$  \*\* $P < .01$

## Discussion

The purpose of the present study was to examine the reliability and validity of a Swedish-language version of the CPVI. Overall, this translated version was found to have satisfactory reliability and validity in a large sample of adults admitted for treatment for chronic and debilitating pain at a regional specialist pain unit in Sweden. The CPVI values success and values discrepancy subscales yielded high levels of internal consistency. Evidence of construct validity for the CPVI in relation to other measures from the psychological flexibility model was observed as well as evidence of clinical utility in relation to measures of pain-related functioning. Overall, the results were similar to those reported for a sample of British patients seeking treatment from a specialist chronic pain unit in the original validation study (McCracken & Yang, 2006).

To date, no other studies have fully examined the construct validity of the CPVI. We found significant correlations between the CPVI and scores on separate measures of the theoretically-related processes committed action and pain-related acceptance, and with a measure of

psychological inflexibility. In addition, scores on the CPVI contributed significantly to the observed variance in psychological inflexibility together with committed action and pain-related acceptance. Thus, and consistent with the psychological flexibility model (Hayes, Strosahl, & Wilson, 2012; McCracken & Morley, 2014), values-based action appears to be a separable process variable that interacts with other processes specified within the model to explain an individual's overall level of psychological flexibility. Furthermore, and again consistent with the original validation study and the psychological flexibility model as applied to chronic pain, the extent to which the individual acted in accordance with their values was significantly correlated with their functioning across a range of different domains (McCracken & Yang, 2006). Values-based action also explained variance in various domains of pain-related functioning. This contribution of values-based action to improved functioning was demonstrable even after controlling for two other facets of psychological flexibility, where especially one is conceptually similar to it- level of committed goal-focused action. In other words, greater improvements in functioning might be achieved by individuals with chronic pain not only through persistence efforts towards achieving their various goals but when these goals and their efforts are consistent with their values.

The two values subscales were strongly correlated with each other and both scales yielded similar sized correlations with convergent constructs and measures of pain-related functioning. Perhaps this is not surprising given that values discrepancy score is an arithmetic function of values success. The subscales also explained similar levels of variance in various domains of pain-related functioning. In sum, it would seem that the two subscales are too similar and therefore fail to make unique contributions to explaining values-based action when investigated together. Hence, we do not recommend using both scores. It is also worth noting that the importance

ratings, which are included in the calculation of the discrepancy subscale, demonstrated low variability and ceiling effects in this study as well as in the original validation study (McCracken & Yang, 2006) and we would therefore recommend only using the success subscale for practical ease and conceptual simplicity.

There are significant challenges in assessing values that appear in data such as those collected here, are well known clinically, and should be considered in future research. One of these is a lack of self-awareness of values in most people's behavior. While any action is implicitly a kind of values-based action, values are often not explicitly chosen and followed. People's automatic actions often reflect emotional influences, such as fear, or social influences, such as approval from others, and typically do not reflect how people want to live their life, if these influences were taken away. Furthermore, the actual purposes expressed implicitly in people's behavior often include mistaken beliefs that some values are impossible to seek, or an unwillingness to identify a value and risk failure. All of this is to say that values clarification is indeed not straightforward. In fact, identifying values, and reporting on the consistency with which one follows values, may require skills that some respondents have not yet developed before completing treatment to enhance these skills.

We acknowledge several limitations in the current study. First, all findings were based on self-report measures obtained cross-sectionally from a sample referred to a specialist pain unit with a large group of women and individuals with university-level education. Second, the CPVI is a brief measure which only includes a limited number of values domains. On the other hand, the brevity of the measure helps to lessen the assessment burden on patients. Third, all relevant psychometric properties of the CPVI have not been investigated. Future studies could supplement the present validity analyses by investigating the CPVI's sensitivity to change, other reliability

and validity indicators and supplementary processes from the psychological flexibility model, such as present moment awareness and self as observer. Future research with the CPVI should also further clarify the role of values-based action in relation to functioning and treatment outcome in longitudinal designs. Finally, while the findings from the current study were comparable to those from the original British validation study (McCracken & Yang, 2006), value ratings may be influenced by cultural background and further cross-cultural validation of the CPVI is warranted.

## Conclusions

This brief self-report measure of values-based action appears to yield valid data in Swedish adults suffering from chronic pain. Values based processes appear important within evidence-based treatments for chronic pain, especially Acceptance and Commitment Therapy (ACT), and the CPVI may help assess these, particularly in predictor studies of pain-related functioning and analyses of therapeutic change processes or mechanisms.

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***Highlights***

Brief, reliable and valid measures of values are needed

The reliability and validity of a Swedish-language version of the CPVI were examined

The measure displayed satisfactory reliability and validity

The CPVI appears to be a useful values measure for Swedish adults with chronic pain